REMARKS

At the time the present Office Action was mailed (September 17, 2004), claims 3, 6, 8, 32, 37, 38, 43-48, 53, 55, 68, 69, 76-95, and 98-124 were pending. Claim 116 has been cancelled in this response.

In the September 17, 2004 Office Action, claim 116 was objected to and all claims except claims 3, 82, 105, 37, 38, 106, 110 and 113 were indicated to be allowed or allowable. More specifically, the status of the application in light of this Office Action is as follows:

(A) Claim 116 stands objected to as depending from a cancelled claim;

(B) Claims 3, 82, 105, 37, 38, 106, 110 and 113 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,562,529 to Kishii et al. ("Kishii"); and

(C) Claims 6, 8, 32, 53, 55, 68, 69, 76-81, 89-95, 98-104, 114, 115, and 117-124 are allowed, with claims 83-88, 107-109, 111 and 112 indicated to be allowable if rewritten to be in independent form.

The undersigned attorney wishes to thank the Examiner for engaging in a telephone interview on November 24, 2004 to discuss the pending claims and the applied reference. During the interview, the undersigned attorney presented arguments directed to overcoming the outstanding Section 102 rejection of several of the pending claims. These arguments are summarized and expanded upon in the following remarks.

A. Response to the Objection to Claim 116

Claim 116 was rejected as being dependent upon a cancelled base claim. Claim 116 has been cancelled, and accordingly, the objection to claim 16 is now moot.

B. Response to the Section 102 Rejections on the Basis of Kishii

Independent claim 3 is directed to a method for removing an electrically conductive material from a microelectronic substrate. The method includes selecting

first and second conductive electrodes to have a combined surface area facing toward a surface of the microelectronic substrate that is less than the area of the surface of the microelectronic substrate. The first conductive electrode is positioned proximate to the microelectronic substrate, and the second conductive electrode is positioned proximate to the microelectronic substrate and spaced apart from the first conductive electrode. Conductive material is removed from microelectronic substrate by passing a varying current through the first and second electrodes while the first and second electrodes are spaced apart from the conductive material. At least one of the microelectronic substrate and the electrodes is moved relative to the other while passing the current through the electrodes.

Kishii does not disclose removing conductive material from a microelectronic substrate and accordingly cannot form the basis of a Section 102 rejection of claim 3. Kishii instead discloses in Figure 10B an apparatus for monitoring removal of insulating material. The apparatus includes two meshed electrodes 45a, 45b coupled to current detecting means 46. The electrodes are located in through-holes 44a, 44b of a polisher 41, which also include a polishing cloth 43. The current detecting means include a power supply 47 (illustrated as a direct current power source) and an ammeter 48.

Figures 13A-13B illustrate how Kishii uses the apparatus shown in Figure 10B to remove an overlying insulating film 58 from buried conductive structures. In particular, Figure 13A illustrates a semiconductor substrate 54 having two conductive layers 57a, 57b and an interconnection layer 56, all buried beneath an insulating film 58. The polishing cloth 43 of the polisher 41 is brought into contact with the insulating film 58 to remove the insulating film 58 and expose the conductive layers 57a, 57b. Kishii specifically states that "(w)hen the conductive layers 57a and 57b are exposed on the surface of the wafer 55 (sic) through polishing the interlayer insulating film 58, a current is allowed to flow to the ammeter 48 by way of the one electrode 45b, the conductive layer 57b, the lower interconnection layer 56 and the conductive layer 57a and the other electrode 45a by the interposition of ions contained in the abrasive 60" (Kishii at column 8, line 63 to column 9, line 2).

A careful comparison of Figures 13A and 13B indicates that the amount of conductive material in conductive layers 57a and 57b before Kishii removes the insulating film 58 and after Kishii removes the insulating film 58 is exactly the same. Accordingly, Kishii does not disclose removing conductive material and instead discloses only removing an insulating film. In fact, Kishii appears to use his "current detecting means 46" merely to determine when conductive material is exposed, and not to remove conductive material.

Not only does Kishii fail to disclose removing conductive material by passing a varying electrical signal between spaced apart electrodes, but Kishii in fact teaches away from such an arrangement. Kishii discloses that his method is used to "adjust the polish volume by monitoring the current, and hence to eliminate the observation of the polishing surface of the wafer 53 midway through polishing" (Kishii at column 9, lines 3-6). In other words, Kishii merely discloses an electrical method for determining when the removal of an insulating layer has been completed. Kishii goes on to state that "the uniformity and polishing is improved whereby the interlayer insulating film 58a with a specified film thickness certainly remains." (Kishii at column 9, lines 7-9). If Kishii continued to remove material from the wafer after exposing the conductive structures, an insulating film 58a with a specified film thickness would certainly not remain. Accordingly, Kishii explicitly teaches away from the features of claim 3.

Kishii not only fails to disclose a method for removing conductive material from a microelectronic substrate, but Kishii fails to disclose or suggest the way in which conductive material is removed, which is included in claim 3. For example, Kishii fails to disclose or suggest passing a varying current through the first and second electrodes. Instead, Kishii discloses only a direct current power source that forms part of a current detecting means.

In fact, Kishii's disclosure teaches away from passing a varying current through electrodes that are spaced apart from conductive material of a microelectronic substrate. If Kishii's apparatus were set up to pass a varying current through the meshed electrodes 45a and 45b, the current would tend to flow through the electrodes and the conductive material (in the manner of a capacitor) even when the overlying

insulative layer is still present. This would clearly defeat the purpose of Kishii's device, which is configured to detect a current flow only when the insulating film is removed. Accordingly, Kishii utterly fails to support a Section 102 rejection of claim 3, and teaches away from modifying his method to include the features of claim 3. Therefore, the Section 102 rejection of claim 3 should be withdrawn.

Claims 82 and 105 depend from claim 3. Accordingly, the Section 102 rejections of these claims should be withdrawn for the reasons discussed above with reference to claim 3 and for the additional features of these dependent claims.

Claim 37 is also directed to a method for removing an electrically conductive material from a microelectronic substrate. Claim 37 includes, among other features, removing conductive material from the microelectronic substrate by passing a varying current through first and second electrodes while the first and second electrodes are spaced apart from the conductive material of the microelectronic substrate. Accordingly, claim 37 includes features generally similar to those described above with reference to claim 3. Therefore, the Section 102 rejection of claim 37 should be withdrawn for the reasons discussed above with reference to claim 3 and for the additional features of claim 37.

Claims 38, 106, 110 and 113 all depend from claim 37. Accordingly, the Section 102 rejections of these dependent claims should be withdrawn for the reasons discussed above, and for the additional features of these dependent claims.

C. Response to the Indication of Allowable Subject Matter

The undersigned attorney wishes to thank the Examiner for his indication of allowed and allowable subject matter. The allowed and allowable claims have not been amended herein.

D. Conclusion

In view of the foregoing, the claims pending in the application comply with the requirements of 35 U.S.C. § 112 and patentably define over the applied art. A Notice of Allowance is, therefore, respectfully requested. If the Examiner has any questions or

believes a telephone conference would expedite prosecution of this application, the Examiner is encouraged to call the undersigned at (206) 359-3257.

Respectfully submitted,
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